

REMARKS/ARGUMENTS

Status of Claims

Claims 10, 14-19, and 23-30 are pending in the application, with claims 10, 19, and 28 being the only independent claims. Claims 10, 14-19, and 23-30 stand rejected. By this Amendment, claims 10, 16, 17, and 28 have been amended. The amendments made to claims 10, 16, 17, and 28 do not alter the scope of these claims, nor have these amendments been made to define over the prior art. Rather, the amendments to the claims have been made for cosmetic reasons to improve the form thereof. In light of the amendments and remarks set forth below, Applicant respectfully submits that each of the pending claims is in immediate condition for allowance.

Summary of the Office Action

Claims 10, 14-16, 18, 19, 23-25, 27, and 28 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,134,324 (“Sakagami”) in view of U.S. Patent No. 4,876,765 (“Tucker”) and U.S. Patent No. 4,624,617 (“Belna”).

Claims 17 and 26 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakagami in view of Tucker and Belna in view of U.S. Patent No. 5,712,516 (“Kabout”).

Claims 29 and 30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakagami in view of Tucker and Belna in view of Japanese Patent Publication 2002-209371.

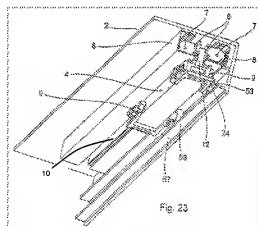
Amendments addressing Section 112 issues

Claims 10, 14-19, and 23-30 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite. Applicants have amended claims 10, 16, 17, and 28 in consideration of the Examiner’s comments. Reconsideration and withdrawal of the rejection is therefore requested.

Subject Matter Described in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations, which are unclaimed.

The present application discloses a linear drive arrangement for a sliding door in which a drive carriage of a sliding door 5 is movable by a linear drive 1 and the sliding door 5 is suspended by a magnetic force of the linear drive 1. The linear drive 1 includes a stationary guide rail 3 mounted in a holder 2 (see Fig. 1 and par. [0017]). The guide rail 3 includes C-shaped slide rails 6, which are spaced apart with their open sides facing away from one another (see par. [0018] and Fig. 1). Coils 7 are arranged on oppositely facing open sides of the C-shaped slide rails 6 (see par. [0018] and Fig. 1).



The linear drive 1 also includes a guide carriage 4, which is displaceable in the guide rail 3 (see par. [0017] and Fig. 1) and carries the sliding door 5 to be movable in the direction of the guide rail 3. A portion of the guide carriage 4 is located between the slide rails 6. The guide carriage 4 includes a supporting rail 10 connected to a holding member 12 (see par. [0019] and Fig. 2). Magnets 13 are received in the holding member 12 and cooperate with the coils 7 to form a

holder and a drive for the sliding door 5 (see par. [0019]). As described above, the magnets 13 are arranged between the rails 6 on which the coils 7 are mounted and the magnets 13 and coils 7 are thus horizontally co-planar (see par. [0059] and Figs. 1 and 23).

At least one supporting roller 53 is provided to support the guide carriage 4 on a guide track 57 when the guide carriage 4 is not fully suspended by the magnetic force, i.e., at the beginning and end of movement of the guide carriage 4 (see Fig. 23, reproduced above).

In other words, the permanent magnets and the coils form the holder that at least partially suspends the door. At least a portion of the permanent magnets is arranged horizontally coplanar with the coil and the magnets 13 are arranged between rails 6 and that the coils 7 are arranged on the outer sides of the guide rails 6 (see par. [0059] and Figs. 1 and 23).

Patentability of the Invention

A. Independent Claim 10 is Allowable

Independent claim 10 recites “a plurality of permanent magnets fixed to said guide carriage, wherein at least a portion of each of the permanent magnets is horizontally co-planar with said coils” and “said permanent magnets and said coils form a holder so that the guide carriage and the door leaf affixed thereto is suspended at least partially by a magnetic force between said permanent magnets and said coils of said stator arrangement” and “wherein the same permanent magnets and coils form a linear drive for the door leaf so that the guide carriage can be driven along said guide track by said magnetic force.”

The combination of Sakagami, Tucker, and Belna fails to disclose magnets and coils that are horizontally co-planar, that generate a magnetic force that at least partially suspends the door, and that form a linear drive that drives the guide carriage along the guide track.

The Office Action alleges that Belna discloses the claimed guide carriage suspended at least partially by a magnetic force between said coils of a stator arrangement. Applicants disagree.

Belna discloses a semiconductor wafer transportation mechanism 10. The mechanism 10 includes a track 12 upon which rides a car 14. The car 14 includes a U-shaped fork 20 attached to a pair of guides 18 which engage the track 12. The track 12 includes a bottom flange 26 to which is attached a pair of vertical support flanges 24 supporting a horizontal track 28. Screws 30 secure the bottom flange 26 of the track to a track bed 22.

Belna's car 14 is moved along the track 12 by linear induction. The linear induction motor used in the apparatus 10 includes a plurality of permanent magnets 42 disposed in the car 14 beneath the fork 20 and between the car guides 18. A plurality of these permanent magnets 42 are provided with the magnets 42 being arranged such that the north and south pole ends are adjacent. Cooperating with the magnets 42 is a series of electromagnets beneath the track 12, each electromagnet comprising a pole piece 38 supporting a coil 40 and supported upon the track flange 26 by a pair of supports 44. Each of the coils 40 is connected to the control circuitry 16, which is conventional circuitry known in the art. The control circuitry 16 sequentially energizes each of the coils 40 to move the car 14 along the track 12.

Initially, Applicants submit that one skilled in the art would not consider Belna when designing a door arrangement. Belna relates to a semiconductor wafer transport mechanism. A wafer is a small lightweight object, quite unlike a door leaf. In contrast, a door leaf is a large heavy object. Moving a door leaf requires more magnetic force than that required in Belna at least in part because the door leaf is much heavier than a semiconductor wafer. Further, it is more than a mere matter of scale to modify Belna to carry a door leaf. In fact, the size and weight difference between a door and a wafer would provide no suggestion to use a

configuration like Belna's to function as a linear drive arrangement for a door leaf. Because the wafer is a lightweight element whereas a door is far heavier, the result is a requirement for much higher magnetic forces leading one skilled in the art away from using Belna to improve a door arrangement.

Further, The magnetic lifting device in Belna cannot be integrated into a linear motor of resulting from a combination of Sakagami and Tucker. First, magnetic lifting forces that are necessary to magnetically suspend a door wing must be determined. The required lifting force will determine the arrangement, number, size, and number of magnets and coil windings. As mentioned above, the minimal lifting forces required for a semiconductor wafer are unlike the magnetic forces and required configuration to lift a door leaf.

Still further, Belna's wafer transport mechanism cannot be integrated or adapted into a linear motor of Sakagami and Tucker because in both Sakagami's and Tucker's door arrangement, each door wing is suspended downwardly towards a floor. In both Sakagami and Tucker, the door wing suspension is provided by rollers rolling on tracks directed upwardly to a ceiling. Thus, Sakagami and Tucker both fail to disclose that the drive is also used to carry or suspend the door.

In contrast, Belna's mechanism is based "on a track 12 upon which rides a car 14" (Belna at col. 2, ll. 56-57 and Fig. 2). Thus, Belna discloses a magnetic lifting mechanism in which car 14 is pushed upwardly, thereby realizing necessary distance between coils 40 attached to track 12 and permanent magnets 42 disposed within car 14. Car 14 is moved above track 14. This prevents arranging door suspension or its rollers above a linear lifting mechanism of Belna to push a door wing upwards. Thus, the arrangement of magnets and coils such that they provide both a driving force and a weight lifting force for a suspended door is missing from the cited combination.

In view of all the above, independent claim 10 is allowable.

B. Independent Claim 19

Similar to independent claim 10, independent claim 19 recites, *inter alia*, “a plurality of permanent magnets fixed to said guide carriage, at least a portion of each of said permanent magnets being horizontally co-planar with said coils, and said permanent magnets and said coils being operable to generate a magnetic force for at least partially suspending the guide carriage and linearly driving the guide carriage along said guide track.” The combination of Sakagami, Tucker, and Belna fails to teach the above limitations. Accordingly, independent claim 19 is allowable over the prior art of record for at least the same reasons submitted above in connection with independent claim 10.

C. Independent Claim 28

Similar to independent claim 10, independent claim 28 recites that “a plurality of magnets fixed to said guide carriage, at least a portion of each of said permanent magnets being horizontally co-planar with said coils, and said magnets and said coils form a holder so that the guide carriage, with the fixed door leaf, is suspended at least partially by a magnetic force between said magnets and said stator arrangement, and wherein the same magnets and coils form a linear drive for the door leaf so that the guide carriage can be driven along said guide track by said magnetic force.” Therefore, independent claim 28 is allowable for the same reasons that independent claim 10 is allowable.

D. Dependent Claims 14-18 and 20-27

Claims 14-18 and 20-27 depend, directly or indirectly, from allowable independent claim 10 and are therefore allowable therewith.

In addition, dependent claims 14-18 and 20-27 each include features that serve to even more clearly distinguish the claimed invention over the applied prior art.

Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited. Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

No fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our PTO Deposit Account No. 03-2412.

Respectfully submitted,
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